Dina Mistry

Network Scientist · Infectious Disease Modeler · Complex Systems Researcher

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Summary

Computational researcher with an interdisciplinary background in physics, network science, and epidemiology. 8 years of experience modeling real world complex systems, contagion phenomena, and data driven models of diverse human contact networks. My interests lie in developing tools and methods for data driven research in health as a social process with a focus on equity and open science practices.

Education

Northeastern University — *Boston, MA*

Ph.D. in Physics — *01/2014 - 01/2019*

Dissertation: The Heterogeneous Nature of Contagion Processes in Complex Networks

Advisor: Dr. Alessandro Vespignani, Network Science Institute Director and Sternberg Family Distinguished Professor

Northeastern University — *Boston, MA*

M.Sc. in Physics — *09/2012 - 01/2014*

University of Toronto — *Toronto, Canada*

Hon. B.Sc. in Physics & Astronomy, Minor in Mathematics with High Distinction — *09/2007 - 05/2012*

Undergraduate Thesis: The Axisymmetric Geometry of Saturn's Magnetic Fields

Advisor: Dr. Sabine Stanley, Bloomberg Distinguished Professor

Experience

Twitter — *1355 Market Street, Suite 900 San Francisco, CA 94103*

Data Scientist II

Cortex Data Science — *06/01/2021 - PRESENT*

- Lead data scientist for Consumer Identities Strategy
- Delivering data-driven insights to inform platform changes to improve the user experience and self expression
- Collaborating in cross functional teams with product, engineering, and data science

Institute for Disease Modeling, The Bill & Melinda Gates Foundation — *500 5th Avenue, Seattle, WA 98109*

Postdoctoral Research Scientist

Network Epidemiology and Behavior — *07/13/2020 - 05/31/2021*

- Modeling strategies and tradeoffs for reopening schools in King County, Washington during the COVID-19 pandemic
- Presenting COVID-19 modeling and analysis to local public health stakeholders to inform ongoing strategies
- Collaborating to forecast COVID-19 transmission dynamics to assess the risks and benefits of school based interventions in global settings
- Engaging with in-country stakeholders in Senegal and Kenya, as well as from the World Bank and PATH organizations to develop models for surveillance of COVID-19 transmission and cost benefit analysis
- Leading modeling of health information campaign strategies to promote mask usage and social distancing in Dakar, Senegal during COVID-19
- Lead developer and maintainer of an open-source Python package to generate data-driven human contact networks around the globe for research on public health
- Collaborating in cross functional teams to develop open source tools for public health research

Institute for Disease Modeling, Intellectual Ventures — *3150 139th Avenue SE, Bellevue, WA 98005*

Postdoctoral Research Scientist

Network Epidemiology and Behavior — *02/04/2019 - 07/13/2020*

- Modeling the control and mitigation of COVID-19 pandemic in human contact networks in the US and global populations
- Presented COVID-19 modeling and analysis to local public health officials to inform ongoing control strategies
- Lead developer and maintainer of an open-source Python package to generate data-driven human contact networks around the globe for research on public health
- Modeling contagion-like adoption of awareness and health behaviors in social networks
- Modeling the role of social trust and the long standing effects of memory of disease risk in acceptance of health (mis)information
- Collaborating in cross functional teams to develop open source tools for public health research

Northeastern University *177 Huntington Avenue, Boston, MA, 02115*

Graduate Researcher, MOBS Lab, Network Science Institute

Synthetic Contact Networks *10/15/2015 - 01/23/2019*

- Developed adaptive algorithms to generate synthetic human contact networks using public data sources for diverse populations
- Modeling infectious disease spreading in data-driven synthetic contact networks
- Implemented Markov chain Monte Carlo (MCMC) and other computational methods to infer epidemiological parameters and validate with serological data
- Built and maintained a database of age mixing contact matrices for 300+ global locations
- Supervised junior graduate students

H1N1 Pandemic Scenario Analysis *01/04/2015 - 01/23/2019*

- Characterized the predictability of global epidemic spreading patterns across multiple pandemic scenarios from in-silico micro-simulations
- Visualization of stochastic micro-simulations of different pandemic scenarios
- Analyzed commercial airline mobility network data using statistical mechanics, network science, information theoretic measures, and unsupervised machine learning algorithms

Spreading of Zika virus in the Americas (www.zika-model.org) *01/03/2016 - 05/28/2017*

- Developed a stochastic data-driven vector-borne model of the 2016 Zika outbreak in real-time; collaborating with international research groups
- Aided in streamlined analysis pipeline of simulation forecasts for time sensitive reports delivered to global health agencies (CDC, WHO)
- Collected, processed, and analyzed daily epidemiological case report data from 40 Pan-American countries for model calibration

Committed activists and the reshaping of status-quo social consensus *05/01/2013 - 10/22/2015*

- Developed agent based models of negotiation on conventions and opinion adoption in temporal social networks
- Explored campaign strategies to reduce the time and critical mass needed to drive populations towards consensus, as well as the hindering effects of community structures (echo chambers)
- Presented findings at the 2017 International School and Conference on Network Science

Publications

* Indicates equal contribution

Peer Reviewed

Covasim: an agent-based model of COVID-19 dynamics and interventions.
C. C. Kerr, R. M. Stuart*, **D. Mistry***, R. G. Abeysuriya, G. R. Hart, K. Rosenfeld, P. Selvaraj, R. C. Núñez, B. Hagedorn, L. George, A. Izzo, A. Palmer, D. Delport, C. Bennette, B. Wagner, S. Chang, J. A Cohen, J. Panovska-Griffiths, M. Jastrzebski, A. P. Oron, E. Wenger, M. Famulare, D. J. Klein. 2021. *Accepted at PLoS Comput. Biol.* https://www.medrxiv.org/content/10.1101/2020.05.10.20097469v1

Controlling SARS-CoV-2 via test-trace-quarantine.
C. C. Kerr, **D. Mistry***, R. M. Stuart*, K. Rosenfeld, G. R. Hart, P. Selvaraj, R. C. Núñez, J. A. Cohen, R. G. Abeysuriya, L. George, B. Hagedorn, M. Jastrzebski, M. Fagalde, J. Duchin, M. Famulare, and D. J. Klein. Nat. Commun. 12. 2993. 1-12. 2021.
https://doi.org/10.1038/s41467-021-23276-9

Inferring high-resolution human mixing patterns for disease modeling.
D. Mistry, M. Litvinova, A. Pastore y Piontti, M. Chinazzi, L. Fumanelli, M. F. C. Gomes, S. A. Haque, Q. Liu, K. Mu, X. Xiong, M. E. Halloran, I. M. Longini, S. Merler, M. Ajelli, A. Vespignani. Nat. Commun. 12. 323. 2021. https://doi.org/10.1038/s41467-020-20544-y

Estimating and mitigating the risk of COVID-19 epidemic rebound associated with reopening of international borders in Vietnam: a modelling study
Q. D. Pham, R. M. Stuart, T. V. Nyugen, Q. C. Luong, D. Q. Tran, T. Q. Pham, L. T. Phan, T. Q. Dang, D. N. Tran, H. T. Do, **D. Mistry**, D. J. Klein, R. G. Abeysuriya, A. P. Oron, and C. C. Kerr. Lancet Glob Health. 9. 7. 916-924. 2021. https://doi.org/10.1016/S2214-109X(21)00103-0

Robust test and trace strategies can prevent COVID-19 resurgences: a case study from New South Wales, Australia
R. M. Stuart, R. G. Abeysuriya, C. C. Kerr, **D. Mistry**, D. J. Klein, R. Gray, M. Hellard, N. Scott. BMJ Open 11. 4. 2021.
http://dx.doi.org/10.1136/bmjopen-2020-045941

Seeding COVID-19 across sub-Saharan Africa: an analysis of reported importation events across 40 countries.
L. A. Skrip, P. Selvaraj, B. Hagedorn, A. L. Ouédraogo, N. Noori, **D. Mistry**, J. Bedson, L. Hébert-Dufresne, S. V. Scarpino, B. M. Althouse. Am J Trop Med Hyg. 104. 5. 2021. https://doi.org/10.4269/ajtmh.20-1502

Modelling the potential impact of mask use in schools and society on COVID-19 control in the UK
J. Panovska-Griffiths, C. C. Kerr, W. Waites, R. M. Stuart, **D. Mistry**, D. Foster, D. J. Klein, R. M. Viner, C. Bonell. Sci. Rep. 11. 1. 2021.
https://doi.org/10.1038/s41598-021-88075-0

Determining the optimal strategy for reopening schools, work and society in the UK: balancing earlier opening and the impact of test and trace strategies with the risk of occurrence of a secondary COVID-19 pandemic wave.
J. Panovska-Griffiths, C. C. Kerr, R. M. Stuart, **D. Mistry**, D. J. Klein, R. M. Viner, C. Bonell. Lancet Child Adolesc Health. 4. 11. 817-827. 2020. https://doi.org/10.1016/S2352-4642(20)30250-9

Modelling the impact of relaxing COVID-19 control measures during a period of low viral transmission
N. Scott, A. Palmer, D. Delport, R. Abeysuriya, R. M. Stuart, C. C. Kerr, **D. Mistry**, D. J. Klein, R. Sacks-Davis, K. Heath, S. W. Hainsworth, A. Pedrana, M. Stoove, D. Wilson, M. E. Hellard. Med J Aust. Online2020 https://doi.org/10.5694/mja2.50845

Spread of infectious disease and social awareness as parasitic contagions on clustered networks.
L. Hébert-Dufresne, **D. Mistry**, B. M. Althouse. Phys. Rev. Res. 2. 3. 2020. https://link.aps.org/doi/10.1103/PhysRevResearch.2.033306

Quantifying the risk of Zika virus local transmission in the continental US during the 2015-2016 ZIKV epidemic.
K. Sun, Q. Zhang, A. Pastore-Piontti, M. Chinazzi, **D. Mistry**, N. E. Dean, D. P. Rojas, S. Merler, P. Poletti, L. Rossi, M. E. Halloran, I. M. Longini, A. Vespignani. BioMed Central Medicine. 16. 1. 195. 2018. https://doi.org/10.1186/s12916-018-1185-5

Spreading of Zika virus in the Americas.
Q. Zhang, K.Sun, M. Chinazzi, A. Pastore-Piontti, N. E. Dean, D. P. Rojas, S. Merler, **D. Mistry**, P. Poletti, L. Rossi, M. Bray, M. E. Halloran, I. M. Longini, A. Vespignani. Proceedings of the National Academy of Sciences. 114. 22. E4334-E4343. 2017. https://doi.org/10.1073/pnas.1620161114

Committed activists and the reshaping of status-quo social consensus.
D. Mistry, Q. Zhang, N. Perra, A. Baronchelli. Phys. Rev. E. 92. 042805. 2015. https:/doi.org/10.1103/PhysRevE.92.042805

Submitted & Under Review

Modelling the impact of reopening schools in early 2021 in the presence of the new SARS-CoV-2 variant and with roll-out of vaccination against COVID-19
J.Panovska-Griffiths, R. M. Stuart, C. C. Kerr, K. Rosenfeld, **D. Mistry***, W. Waites, D. J. Klein, C. Bonell, R. M. Viner. 2021. https://www.medrxiv.org/content/10.1101/2020.09.02.20186742v1

Schools are not islands: Balancing COVID-19 risk and educational benefits using structural and temporal countermeasures
J. A. Cohen, **D. Mistry**, C. C. Kerr, and D. J. Klein. 2020. https://www.medrxiv.org/content/10.1101/2020.09.08.20190942v1

Preventing a cluster from becoming a new wave in settings with zero community COVID-19 cases.
R. G. Abeysuriya, D. Delport, R. M. Stuart, R. Sacks-Davis, C. C. Kerr, **D. Mistry**, D. J. Klein, M. Hellard, and N. Scott. 2020. https://www.medrxiv.org/content/medrxiv/early/2020/12/22/2020.12.21.20248595.full.pdf

In Preparation

SynthPops: A generative model of synthetic contact networks.
D. Mistry, C. C. Kerr, M. Wu, M. Fisher, R. G. Abeysuriya, A. Thompson, L. A. Skrip, J. A. Cohen, B. M. Althouse, and D. J. Klein.

Evaluating health promotion to mitigate COVID-19 in Senegal: the impact of more intentional interactions for positive behavior change.
D. Mistry*, L. A. Skrip*, N. Noori*, A. Oron, B. M. Althouse, I. Ba, and M. Sall.

Reports & Other Writing

Stepping Back to School: A step-by-step look at COVID introduction, spread, and exportation
D. J. Klein., C. C. Kerr, **D. Mistry**, E. Wenger, J. A. Cohen. 2021. Report on Infohub

Testing the waters: is it time to go back to school?
D. J. Klein., C. C. Kerr, **D. Mistry**, N. Thakker, J. A. Cohen. 2020. Report on Infohub

Maximizing education while minimizing covid risk: priorities and pitfalls for reopening schools
J. A. Cohen, **D. Mistry**, C. C. Kerr, D. J. Klein, M. Izzo, J. Schripsema. 2020. Report on Infohub

Schools are not islands: we must mitigate community transmission to reopen schools.
J. A. Cohen, **D. Mistry**, C. C. Kerr, M. Famulare, D. J. Klein, M. Izzo, J. Schripsema. 2020. Report on Infohub

Modeling countermeasures for a balanced reopening in King County, Washington.
K. Rosenfeld, C. C. Kerr, J. Cohen, R. Núñez, G. Hart, **D. Mistry**, P. Selvaraj, and D. J. Klein. 2020. Report on InfoHub

COVID-19 intervention effectiveness and epidemic trends for Oregon: a model-based analysis.
C. C. Kerr, B. Hagedorn, **D. Mistry**, and D. J. Klein. 2020. Report on Infohub

Presentations

Invited Talks

NSF PREPARE Workshop: Social, Behavioral, Economic and Governance — *Virtual*
Networks all around: Social contact patterns and what they can tell us about COVID-19 control and interventions — *06/25/2021*

University of Copenhagen — *Virtual*
Guest Lecturer in Mathematical Modeling in Epidemiology Graduate Course — *05/31/2021*

Center for Statistics and Quantitative Infectious Diseases, Fred Hutch Cancer Research Center & University of Florida — *Virtual*
Network Epidemiology & COVID-19 — *05/05/2021*

University of Notre Dame — *Virtual*
Guest Speaker in Infectious Disease Epidemiology and Ecology Graduate Course — *03/05/2021*

COVID Modeling Panel, National Institute of Statistical Sciences — *Virtual*
Covasim: An Open Source Agent-Based Model of COVID-19 Transmission and Control — *12/16/2020*

Modelling the spread and impact of COVID-19, Graz Schumpeter Centre — *Virtual*
Covasim: An Open Source Agent-Based Model of COVID-19 Transmission and Control — *12/10/2020*

Women in Network Science Seminar, University of Washington — *Virtual*
Network Epidemiology and COVID-19
Recording: https://youtu.be/d00J7t5akPU — *12/09/2020*

Data and Methods Brown Bag, University of Washington — *Virtual*
SynthPops: Social Contact Network Modeling for the COVID-19 Pandemic — *11/18/2020*

Institute for Pure and Applied Mathematics (IPAM) — *Virtual*
Panelist, Mathematical Models in Understanding COVID-19: Science Communication — *08/13/2020*

Network Science for Social Good (NetSci 2019) — *Burlington, VT*
Diversify NetSci — *05/27/2019*

Data Science and Methods 573, University of Washington — *Seattle, WA*
Guest Lecturer on Network Science — *02/28/2019*

Institute for Disease Modeling — *Bellevue, WA*
The effects of complex networks on infectious disease spreading — *09/27/2018*

Humanyze — *Palo Alto, CA*
Exploring the effects of complex networks on contagion phenomena — *09/03/2018*

Conference on Complex Systems — *Cancun, Mexico*
The influence of cultural and societal diversity on epidemic spreading — *09/19/2017*

Contributed Talks

Networks 2021 — *Virtual*
The longstanding effects of disease awareness, memory, and social trust on infectious disease spreading in multigenerational networks — *07/07/2021*

Networks 2021 — *Virtual*
SynthPops: A Generative Model of Human Contact Networks — *07/05/2021*

International School and Conference on Network Science (NetSci 2020) — *(Virtual) Rome, Italy*
Diversity, Equity, & Inclusion in Network Science and Society — *09/19/2020*

International School and Conference on Network Science (NetSci 2019) — *Burlington, VT*
Inferring high-resolution disease specific human mixing patterns — *05/29/2019*

3MinuteThesis, GWISE, Snell Library, Northeastern University — *Boston, MA*
Data-driven approaches to infectious disease modeling and the role of human interaction networks — *10/16/2018*

International Conference on Complex Networks — *Boston, MA*
A data-driven approach to infer social contact networks in the context of infectious disease modeling — *03/05/2018*

Grad Research Panel, Snell Library, Northeastern University — *Boston, MA*
Data-driven approaches to stochastic infectious disease modeling — *02/28/2018*

International School and Conference on Network Science (NetSci 2017) — *Indianapolis, IN*
Committed activists and the reshaping of status-quo social consensus — *06/22/2017*

Poster Presentations

Epidemics — *Charleston, SC*
The longstanding effects of disease awareness and social memory on infectious transmission in networks — *12/04/2019*

Research, Innovation, and Scholarship Expo, Northeastern University — *Boston, MA*
Using data-driven models to infer social contact patterns in the context of epidemics — *04/07/2016*

Professional Service & Leadership

Conferences, Panels, Institutes, and Workshops

2021	**Parallel Session Chair**, Networks 2021	*(Online)*
2021	**Poster Adjudicator**, Networks 2021	*(Online)*
2020	**Panel Moderator: Decolonizing Global Health**, IDM Diversity, Equity, & Inclusion Committee	*(Online) Seattle, WA*
2020	**Co-Organizer & Reviewer**, NetSci 2020 Financial Support Committee	*(Online) Rome, Italy*
2020	**Panel Moderator: Diversifying Network Science**, 2nd Annual Diversify Netsci, NetSci 2020	*(Online) Rome, Italy*
2020	**Co-Chair**, 2nd Annual Diversify Netsci, NetSci 2020	*(Online) Rome, Italy*
2020	**Parallel Session Chair**, NetSci 2020	*(Online) Rome, Italy*
2020	**Program Committee**, NetSci 2020	*(Online) Rome, Italy*
2020	**Program Committee**, NetSci-X 2020 Winter Conference	*Tokyo, Japan*
2019	**Co-Chair**, Inaugural Diversify NetSci, NetSci 2019	*Burlington, VT*
2018	**Program Committee**, International Conference on Complex Networks	*Boston, MA*
2018	**Art of Networks local organizer**, International Conference on Complex Networks	*Boston, MA*
2018	**Paper Unwind Co-Organizer: Society of Young Network Scientists (SYNS)**, International Conference on Complex Networks	*Boston, MA*

Professional Societies

2019-2021	**Chair**, Society for Young Network Scientists (SYNS)	*International*
2018	**Women's Summer Retreat Organizer**, GWISE (Graduate Women in Science and Engineering)	*Cambridge, MA*

Peer Review

2021	**Manuscript Reviewer**, Journal of Theoretical Biology
2021	**Manuscript Reviewer**, Bulletin of Mathematical Biology
2020	**Manuscript Reviewer**, Royal Society Open Science
2020-2021	**Manuscript Reviewer**, Nature Communications
2020	**Manuscript Reviewer**, Communications Physics
2019-2021	**Manuscript Reviewer**, PLOS Computational Biology
2019	**Manuscript Reviewer**, Chaos AIP
2017	**Manuscript Subreviewer**, PLOS ONE

Departmental Service

2018	**Senior Grad Panel, Graduate School & Research**, Dept. of Physics, Northeastern University	*Boston, MA*
2017	**Panel member, Diversity and Inclusion Town Hall**, College of Science, Northeastern University	*Boston, MA*
2017	**Professional Development Workshop Organizer**, Dept. of Physics, Northeastern University	*Boston, MA*
2016-2018	**Graduate Student Union Dept. Leader**, Dept. of Physics, Northeastern University	*Boston, MA*
2014-2016	**Physics Graduate Student Representative**, Northeastern University	*Boston, MA*
2012	**Transit of Venus Outreach Science Volunteer**, Dept. of Astronomy & Astrophysics	*Toronto, Canada*
2011-2012	**Vice President of Academic Affairs**, Physics & Astronomy Student Union, University of Toronto	*Toronto, Canada*

Teaching

2014	**Physics Lab Instructor**, U.S. Pathway Program (USPP), a summer bridge program for international students from China and Nigeria	*Northeastern University*
2012-2014	**Physics Lab Instructor**, Introductory Physics Labs (16 sections), Department of Physics	*Northeastern University*
2013-2014	**Physics Workshop Leader**, (6 sections) Department of Physics	*Northeastern University*
2012	**Interactive Learning Sessions Teaching Assistant**, Department of Physics	*Northeastern University*
2011	**AST201H1 Teaching Assistant**, Department of Astronomy & Astrophysics	*University of Toronto*

Advanced Schools & Workshops

Vermont University *Burlington, VT*

Invited participant to the Workshop on Invasion in Ecological Networks *08/25/2019 - 08/31/2019*

Université Laval *Quebec City, Canada*

Participant in the 1st Complex Networks Winter Workshop *12/15/2018 - 12/22/2018*

University of Washington *Seattle, WA*

Attended the 7th Annual Summer Institute in Statistics and Modeling in Infectious Diseases *07/05/2015 - 07/22/2015*

Certificates obtained in the modules:

- Probability and Statistical Inference
- Stochastic Epidemic Models with Inference
- Simulation-based Inference for Epidemiological Dynamics
- MCMC I & II for Infectious Diseases

Awards & Honors

2015	**Summer Institute in Statistics and Modeling in Infectious Diseases Scholarship**, 7th Annual Summer Institute	*University of Washington*
2012-2014	**Graduate Teaching Assistantship Award**, Department of Physics	*Northeastern University*
2012	**Anna & Alex Beverly Memorial Fellowship**, for future graduate studies	*University of Toronto*
2012	**Marie Sklodowska-Curie Association Undergraduate Scholarship**, for academic excellence in Physics	*University of Toronto*
2011	**Undergraduate Summer Research Award**, Highly competitive research assistantship award. Conducted experiments to study the nonlinear growth of stalactites. *Advisor: Prof. Stephen Morris.*	*University of Toronto*
2008-2012	**Dean's List of Scholars**, Faculty of Arts & Science	*University of Toronto*
2008	**C. L. Burton Scholarship for Mathematics and Physics**, Faculty of Arts & Science	*University of Toronto*
2007	**Top Scholar's Scholarship**, Faculty of Arts & Science	*University of Toronto*
2007	**President's Entrance Scholarship**, Faculty of Arts & Science	*University of Toronto*

Software

Open Source Software

Lead Developer

SynthPops: Python, PyPI | http://synthpops.org/ *03/09/2020 - Present*

Developer
COVASIM: PYTHON, PYPI | HTTPS://COVASIM.ORG *03/15/2020 - Present*

Skills & Expertise

Programming Python (NumPy, Pandas, GeoPandas, scikit-learn, Cartopy), C++, SQL
Visualization Matplotlib, d3, Gephi
Software LaTeX, Git, Linux, MacOS, Microsoft Office, Notion

Media Coverage

Diseases Spread Differently, Region by Region. This Mathematical Model Shows How. News@Northeastern

The Science That Spans MeToo, Memes, and Covid-19 WIRED

'Covid Near You' Crowdsources Data to Predict New Hot Spots WIRED

Projecting the spread of Zika The Atlantic, New Scientist, Homeland Security News Wire, WBUR Boston NPR's News Station

PhD Profile: Canis lupus Graduate Student Newsletter, Northeastern University

Live Musical Performances

I am a multi-instrumentalist playing the steel pan family of instruments (native to the island nation of Trinidad and Tobago) since the age of 10, and performing publicly since the age of 14. From 14 through 18, I was a member of 3 performance bands, including 2 steel pan bands and a Jazz/Motown Ensemble while growing up in Toronto. Most recently, I have joined the Seattle Steel Pan Project. My main instruments are the Double Tenor and Tenor Pans, though I am also known to play the Double Seconds, 6 Bass, Treble Bass, and Cello Pans.

SEATTLE STEEL PAN PROJECT

Seattle Waterfront Festival, Pier 62 *07/10/2021 Seattle, WA*
Seattle University *09/22/2019 Seattle, WA*
Jackson Street Jazz Walk *09/07/2019 Seattle, WA*
Belltown Crush *08/24/2019 Seattle, WA*
Othello Park International Festival *08/11/2019 Othello, WA*
Seattle Caribbean Festival *07/28/2019 Seattle, WA*
Fremont Solstice Parade *06/22/2019 Fremont, WA*
Highline College *05/23/2019 Des Moines, WA*
Powered By Women, Langston Hughes *03/30/2019 Seattle, WA*